

**WE CLAIM:**

1. A method for selecting a modulation configuration in a multi-carrier modulation system that supports a plurality of modulation configurations, comprising steps of:

for each modulation configuration  $m$ , determining a number of sub-carriers  $k_m$  having a signal-to-noise ratio above a predefined threshold  $\gamma_m$ ; computing a number of useful sub-carriers  $n_m$  by dividing  $k_m$  by a predefined ratio  $r_m$ ; constructing a sub-set of sub-carriers by selecting  $n_m$  sub-carriers having the highest signal-to-noise ratio; and, computing a throughput  $t_m$ , by multiplying  $n_m$  by a predefined capacity  $c_m$  per sub-carrier; and

selecting the modulation configuration having the highest throughput.

2. A method as claimed in claim 1, wherein the step of computing a number of useful sub-carriers further comprises a step of ensuring that the number of useful sub-carriers is an integer value not greater than  $n$ .
3. A method as claimed in claim 2 wherein the step of ensuring is performed using the equation:

$$n_m = \min(n, \text{floor}(k_m/r_m)).$$

4. A method as claimed in claim 1, wherein the predefined threshold  $\gamma_m$  is selected using empirical data derived from simulation results.
5. A method as claimed in claim 1, wherein the predefined ratio  $r_m$  is selected using empirical data derived from simulation results.
6. A method as claimed in claim 5 wherein the ratio  $r_m$  is selected to leverage the corrective power of forward error correction associated with the modulation configuration.
7. An apparatus for selecting a modulation configuration, in a multi-carrier modulation system that supports a plurality of modulation configurations, comprising:
  - means for determining a number of sub-carriers  $k_m$  having a signal-to-noise ratio above a predefined threshold  $\gamma_m$ , for each modulation configuration  $m$ ;
  - means for computing a number of useful sub-carriers  $n_m$  for each modulation configuration  $m$ , by dividing  $k_m$  by a predefined ratio  $r_m$ ;
  - means for constructing a sub-set of sub-carriers by selecting  $n_m$  sub-carriers having the highest signal-to-noise ratio for each modulation configuration  $m$ ;
  - means for computing a throughput  $t_m$ , for each modulation configuration  $m$ , by multiplying  $n_m$  by a predefined capacity  $c_m$  per sub-carrier; and

means for selecting the modulation configuration having the highest throughput.

8. An apparatus as claimed in claim 7, wherein the means for computing a number of useful sub-carriers further comprises means for ensuring that the number of useful sub-carriers is an integer value not greater than  $n$ .
9. A method for selecting sub-carriers in a modulation system, comprising steps of:
  - selecting a first sub-set of sub-carriers  $k$  having a signal-to-noise ratio that exceeds a predetermined threshold;
  - dividing  $k$  by a predetermined ratio  $r$  to derive a number of sub-carriers to include in a second, larger sub-set of sub-carriers;
  - selecting the second sub-set of sub-carriers by selecting  $n$  sub-carriers having a highest signal-to-noise ratio; and
  - using the  $n$  sub-carriers for data transmission in the modulation system, whereby the predetermined ratio  $r$  is selected to leverage the corrective capacity of a forward error correction used in the modulation system to improve data throughput.
10. A method as claimed in claim 9 wherein the modulation system is a multi-carrier modulation system that supports a plurality  $m$  of modulation configurations, and the method further comprises steps of:

performing the steps of selecting the first sub-set, dividing and selecting the second sub-set for each of the modulation configurations  $m$ ;

computing a throughput  $t_m$ , for each modulation configuration  $m$ , by multiplying  $n_m$  by a predefined capacity  $c_m$  per sub-carrier of each second sub-set of sub-carriers; and

using the modulation configuration having the highest throughput.

11. A power network interface (PNI) for connecting an electronic device to a power line network, comprising:

a sub-carrier map selector adapted to receive a signal-to-noise ratio ( $\text{SNR}_i$ ) for each of a plurality of sub-carriers  $i$ ,  $i=1,2,\dots,n$ ; to select a first sub-set of sub-carriers  $k$ ; and, to divide  $k$  by a predetermined ratio  $r$  to derive a second, larger sub-set  $n$  of sub-carriers for use by the PNI for the transfer of data over the power line network, whereby  $r$  is selected to leverage the corrective capacity of forward error correction associated with a modulation configuration used by the PNI to transmit data over the power line network.

12. A power network interface as claimed in claim 11 wherein the sub-carrier map selector is further adapted to derive the second, larger sub-set  $n$  of sub-carriers for each of a plurality of modulation configurations  $m$  that may be used by the PNI to transfer data over the power line network.

13. A power network interface as claimed in claim 11 wherein the sub-carrier map selector is further adapted to compute a throughput  $t_m$ , for each of the modulation configurations  $m$ , by multiplying  $n_m$  by a predefined capacity  $c_m$  per sub-carrier of each second sub-set of sub-carriers  $n$ .
14. A power network interface as claimed in claim 13 wherein the sub-carrier map selector is further adapted to select one of the modulation configurations  $m$  having a highest throughput  $t_m$  for use by the PNI for the transfer of data over the power line network.
15. A power network interface as claimed in claim 11 wherein the power line network is a home power line network.